CLAIMS

What is claimed is:

1. A method of imaging an object comprising:

providing a light distribution function, the function having a scattering component and an absorption component;

directing light onto an object to be imaged;

detecting light emitted by the object;

forming an electronic representation of the object with the detected light; and

processing the electronic representation using the light distribution function to form an image of the object.

2. The method of Claim 1 further comprising directing light onto the object, the light having a wavelength in the range of 700 nm to 900 nm.

3. The method of Claim 1 wherein the object comprises tissue such that the method further comprises forming an image of the tissue.

4. The method of claim 1 further comprising providing a light source, a detector, and a data processor connected to the detector.

5. The method of claim 1 further comprising providing the light distribution function including a series expansion.

6. The method of Claim 1 further comprising providing a collection time during which light is detected, the collection time being less than 1000 ps.

7. The method of Claim 4 wherein the step of providing a light source comprises providing a laser.

8. The method of Claim 4 wherein the step of providing detector comprises providing a streak camera.

9. The method of Claim 1 wherein the light distribution function comprises a point spread function.

10. The method of Claim 9 further comprising providing a plurality of weighting functions.

11. The method of Claim 1 further comprising determining a size of a cancerous lesion in tissue.

12. A system for imaging an object comprising:

a data processor having a light distribution function, the function having a scattering component and an absorption component;

a light delivery system that delivers light onto an object to be imaged;

a light sensor that detects light emitted by the object, the sensor being connected to the data processor such that an electronic representation of the object is formed with the detected light, the electronic representation being processed using the light distribution function to form an image of the object.

13. The system of Claim 12 further comprising directing light onto the object, the light having a wavelength in the range of 700 nm to 900 nm.

14. The system of Claim 12 wherein the object comprises tissue and further comprising a display connected to the data processor that displays an image of the tissue.

15. The system of Claim 12 further comprising a light source aligned with the detector.

16. The system of Claim 12 further comprising a light distribution function including a series expansion.

17. The system of Claim 12 further comprising a controller that controls a collection time during which light is detected, the collection time being less than 1000 ps.

18. The system of Claim 15 wherein the light source comprises a laser.

19. The system of Claim 12 wherein the sensor comprises a streak camera.

20. The system of Claim 12 further comprising a scanner that provides relative movement between the object being imaged and the sensor.

21. The system of Claim 20 further comprising a controller that controls, the scanner, a gated detector, the light source and data processing.

22. The system of Claim 12 further comprising a plurality of light distribution function.

23. The system of Claim 12 further comprising a fiber optical light coupler.

24. The system of Claim 12 further comprising a probe for insertion into the body to deliver light to tissue.

25. The system of Claim 12 further comprising a plurality of weighting functions.

26. A method of imaging a patient comprising:

providing a light distribution function, the function having a scattering component and an absorption component;

providing an electronic representation of tissue within the patient; and

processing the electronic representation using the light distribution function to form an image of the object.

27. The method of Claim 26 wherein light collected from the patient has a wavelength in the range of 700 nm to 900 nm.

28. The method of Claim 26 further comprises forming an image of a cancerous lesion within the tissue.

29. The method of Claim 26 further comprising providing a data processor programmed with the light distribution function.

30. The method of Claim 26 wherein the light distribution function including a series expansion.

31. The method of Claim 26 further comprising providing a collection time during which light is collected from the patient the collection time being less than 1000ps.

32. The method of Claim 26 further comprising a detector such as a streak camera.

33. The method of Claim 26 further comprises providing alight distribution function having a series expansion component.

34. The method of Claim 26 wherein the light distribution function comprises a point spread function.

35. The method of Claim 34 further comprising providing a plurality of weighting functions.

36. The method of Claim 26 further comprising determining a size of a cancerous lesion in tissue.

37. The method of Claim 26 further comprising collecting light with a fiber optic device.

38. The method of Claim 26 further comprising defining an imaging volume having a plurality of voxels within the body being imaged, each voxel having a weighting factor.

39. The method of Claim 26 wherein the light distribution function includes a transport equation approximation.

40. The method of Claim 26 wherein the light distribution function defines a plurality of light paths having a cross-sectional area, the area being less than diffusion approximation of the area.